

*Observations of Phenomena of Jupiter's Satellites at Windsor,
New South Wales, in the years 1900 and 1902.* By John
Tebbutt.

Day of Observation.	Satel- lite.	Pheno- menon.	Phase.	Mag. Power.	G.M.T. of Observation. h m s	Mean Time of Nautical Almanac. h m s
1900.						
June 30	I.	Tr. Egr.	Int. contact	168	21 26 29	
30	I.	"	Bisection	"	21 28 39	21 31
30	I.	"	Ext. contact	"	21 30 54	
July 1	I.	Ecl. R.	First seen	74	19 32 48	19 33 17
1	I.	"	Full brightness	"	19 35 42	
13	III.	"	First seen	"	20 48 24	20 49 29
13	II.	Tr. Ingr.	Ext. contact	168	22 2 22	
13	II.	"	Bisection	"	22 4 47	21 58
13	II.	"	Int. contact	"	22 7 7	
15	I.	Occ. D.	First contact	"	20 9 2	
15	I.	"	Bisection	"	20 11 7	20 10
15	I.	"	Last seen	"	20 12 52	
15	I.	Ecl. R.	First seen	74	23 21 39	23 22 24
15	I.	"	Full brightness	"	23 25 14	
Sept. 17	II.	"	First seen	"	20 34 4	20 37 2
17	II.	"	Full brightness	"	20 38 59	
Oct. 1	I.	"	First seen	"	20 24 35	20 25 5
1	I.	"	Full brightness	"	20 28 9	
1902.						
Sept. 14	IV.	Occ. D.	First contact	168	23 9 39	
14	IV.	"	Bisection	"	23 13 38	23 21
14	IV.	"	Last seen	"	23 17 33	
14	I.	"	First contact	"	23 14 8	
14	I.	"	Bisection	"	23 15 53	23 16 0
14	I.	"	Last seen	"	23 18 22	
16	I.	Ecl. R.	First seen	74	20 58 30	20 58 50
16	I.	"	Full brightness	"	21 0 18	
19	II.	"	First seen	"	23 47 21	23 48 17
19	II.	"	Full brightness	"	23 50 23	
30	I.	Occ. D.	First contact	138	21 19 49	
30	I.	"	Bisection	"	21 22 9	21 22
30	I.	"	Last seen	"	21 23 58	
Oct. 4	III.	Tr. Ingr.	Ext. contact	"	22 18 1	
4	III.	"	Bisection	"	22 21 40	22 20
4	III.	"	Int. contact	"	22 25 29	
5	II	Tr. Egr.	Int. contact	"	21 41 0	

Nov. 1905.

of Jupiter's Satellites.

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Day of Observation. 1902.	Satel- lite.	Pheno- menon.	Phase.	Mag. Power.	G.M.T. of Observation. h m s	Mean Time of Nautical Almanac. h m s
Oct. 5	II.	Tr. Egr.	Bisection	138	21 44 49	21 46
5	II.	"	Ext. contact	"	21 48 34	
7	I.	Occ. D.	First contact	168	23 11 11	
7	I.	"	Bisection	"	23 13 31	23 13
7	I.	"	Last seen	"	23 15 20	
8	I.	Tr. Ingr.	Ext. contact	"	20 21 7	
8	I.	"	Bisection	"	20 23 12	20 21
8	I.	"	Int. contact	"	20 25 7	
8	III.	Ecl. R.	First seen	"	20 56 9	20 58 48
8	I.	Tr. Egr.	Int. contact	"	22 36 59	
8	I.	"	Bisection	"	22 38 4	22 41
8	I.	"	Ext. contact	"	22 40 54	
9	I.	Ecl. R.	First seen	74	21 13 35	21 13 35
12	II.	Tr. Ingr.	Ext. contact	168	21 21 53	
12	II.	"	Bisection	"	21 23 33	21 19
12	II.	"	Int. contact	"	21 25 43	
13	II.	Tr. Egr.	Int. contact	"	0 11 0	
13	II.	"	Bisection	"	0 13 55	0 15
13	II.	"	Ext. contact	"	0 17 4	
14	II.	Ecl. R.	First seen	74	20 58 30	20 59 20
14	II.	"	Full brightness	"	21 3 4	
15	III.	Ecl. D.	Began to fade	168	21 21 14	
15	III.	"	Last seen	"	21 26 37	21 27 12
15	I.	Tr. Ingr.	Ext. contact	"	22 12 45	
15	I.	"	Bisection	"	22 14 25	22 13
15	I.	"	Int. contact	"	22 16 6	
16	I.	Tr. Egr.	Int. contact	"	0 29 7	
16	I.	"	Bisection	"	0 30 52	0 34
16	I.	"	Ext. contact	"	0 33 6	
16	III.	Ecl. R.	First seen	"	0 57 30	1 0 22
16	III.	"	Full brightness	"	1 3 51	
16	I.	"	First seen	74	23 8 22	23 8 56
16	I.	"	Full brightness	"	23 11 38	
19	II.	Tr. Ingr.	Ext. contact	168	23 53 57	
19	II.	"	Bisection	"	23 55 36	23 50
19	II.	"	Int. contact	"	23 58 1	
21	II.	Ecl. R.	First seen	74	23 37 3	23 37 10
21	II.	"	Full brightness	"	23 40 13	
Dec. 1	I.	"	First seen	43	23 38 14	23 38 18
1	I.	"	Full brightness	"	23 41 39	

Notes.

1900.

June 30. Good definition and observations.

July 1. Observation in partial twilight and unsatisfactory.

13. Beautifully clear sky and good definition at the eclipse, but satellite detected rather late. Poor definition at the transit.

15. Sky beautifully clear, and definition good throughout. Observations good.

Sept. 17. Sky beautifully clear and observation good, but the twilight had not disappeared.

Oct. 1. Sky beautifully clear, and definition good, but twilight strong. Satellite detected rather late.

1902.

Sept. 14. Sky beautifully clear and definition pretty good. The contrast between the brightness and colour of the satellites was remarkable. While the first was very bright and of a yellowish colour up to contact, the fourth was remarkably dull and of a bluish tint.

16. Sky beautifully clear and definition pretty good, but full Moon present. Satellite detected about a second late.

19. Sky clear and definition good. The satellite was suspected a little earlier than the recorded time.

30. Sky hazy, but images steady and pretty well defined.

Oct. 4-5. Beautifully clear, definition good, and observations satisfactory. As the satellite would pass a little north of the centre of the disc I expected the usual dark transit, and was not disappointed. The satellite was seen with great difficulty as a bright spot in contact with the south edge of the great north equatorial belt at $22^h 38^m 7^s$. It then became invisible, and continued so till $22^h 49^m 35^s$, when it was suspected as a faint hazy spot. It gradually grew darker till the time of mid-transit, $0^h 15^m 21^s$, when it was very dark and well defined, but not so dark as the shadow in transit. I have seen the satellite darker.

5. Satellite faint at first contact, definition good.

7. Images steady and well defined, and observations good.

8. Sky beautifully clear throughout; definition fair, but images tumulous at transit ingress. Definition fair and images steady at eclipse, but Moon present. When about one third of its way across the disc, satellite I. was seen as a faint hazy spot; it grew somewhat darker till $22^h 7^m 50^s$, and ceased to be visible at $22^h 18^m 33^s$. The definition at egress was not so good, and the internal contact was noted rather late.

9. Sky beautifully clear.

12-13. Images steady and well defined, particularly at ingress. The satellite was seen as a bright spot till $21^h 52^m 28^s$, when it became invisible. At $0^h 9^m 50^s$ it was again seen as a bright spot. No trace could be seen of it at mid-transit.

14. Sky beautifully clear, but Moon very bright; images steady and well defined.

15-16. Beautifully clear throughout, but full Moon present. The conjunction of satellites I. and III. in the plane of their motion occurred about $21^h 17^m 29^s$, but I think the observation was rather late; they appeared to be just in contact. The steadiness and definition at transit ingress were satisfactory. Satellite I. was seen as a bright spot till about $22^h 36^m 17^s$. At $22^h 59^m 43^s$ it became visible as a hazy spot. It was again invisible at $0^h 0^m 32^s$. Observation of the internal contact at egress was difficult owing to the faintness of the satellite, and the recorded time was rather late. Satellite III. suspected at $0^h 57^m 30^s$, but I was certain of it $28\frac{1}{2}$ seconds later. This satellite appeared bluish about three minutes before full brightness.

- Oct. 16. Sky clear near planet and definition good at reappearance of satellite I. The satellite was suspected at the recorded time, but I was certain of it $12\frac{1}{2}$ seconds later.
19. Steadiness and definition very satisfactory.
21. Images steady and well defined, but sky very hazy.
- Dec: 1. Sky hazy near planet, which was rather low for good observation.

The observations of December 1 were made with the $4\frac{1}{2}$ -inch equatorial, and all the others with the 8-inch instrument. An occulting-bar was not employed in the eclipse observations, and the observations of full brightness are only rough approximations. The times given throughout are the Windsor mean times diminished by $10^h 3^m 20^s.5$, and entered to the nearest second. This communication contains all the phenomena of *Jupiter's* satellites observed here since those published for 1898 and 1899 in vol. lx. of the *Monthly Notices*.

Observatory, Peninsula, Windsor, N. S. Wales :
1905 October 1.

Results of Micrometer Measures of Double Stars made with the 28-inch Refractor at the Royal Observatory, Greenwich, in the year 1904.

(Communicated by the Astronomer Royal.)

The measures were made with a bifilar position-micrometer on the 28-inch refractor, focal length 28 feet. The power generally employed was 670, but when definition permitted a power of 1120 was employed for observing very close pairs. When bright stars were observed a blue glass shade was usually employed to diminish the light and irradiation. The observations were made in variously coloured fields or in a dark field with illuminated wires. The initials in the last column are those of the observers, viz. :

L. Mr. Lewis. H. F. Mr. Furner.
W. B. Mr. Bowyer.

On nights when the definition was not sufficiently good for measuring stars in the ordinary Working List, the time was spent in measuring stars from a Supplementary List, made up of Struve stars which have been neglected, or which require periodical observation at intervals of ten years or so, and of miscellaneous stars in which the companion is very faint. As measures of such pairs are not of immediate interest, a list only of the stars observed is given here, the publication of the measures, as well as of the individual results of the observations

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